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# WEATHER PROGRAM UPDATE

## Watershed and Air Management Weather Program


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EXPERIMENT STATION

# THE FOREST SERVICE WEATHER PROGRAM IS NATIONAL IN DIRECTION BUT LOCAL IN IMPLEMENTATION

Welcome to the seventh volume of the *Weather Program Update*. It has been 2 years since the last edition—time does go by fast when you are having fun. We appreciate all your articles and the time you took to prepare and send them. We have captured but a few of the many weather and climate activities that have been ongoing in the last 2 years. We continue to solicit your newsworthy articles and, of course, your ideas for improving this publication. The Weather Program has been very fortunate to have Sara Stockover of the Rocky Mountain Forest and Range Experiment Station return for the third time to serve as editor of this publication while on detail in the Washington Office.

**–Note–**

The use of trade, firm, or corporation names in this publication is for the information and convenience of the reader. This does not constitute an official endorsement of any product or service to the exclusion of others that may be suitable.

## Index of Acronyms

| | |
|---|---|
| AFFIRMS | Administrative Forest Fire Information Retrieval & Management System |
| AFOS | Automated Forecast Observation System |
| ARS | Agriculture Research Service |
| ASCADS | Automated, Storage, Conversion, and Distribution System |
| ASOS | Automated Surface Observing System |
| AWIPS | Advanced Weather Interactive Processing System |
| AWS | Automatic Weather Station |
| BCA | Biological Control Agents |
| BIA | Bureau of Indian Affairs |
| BLM | USDI Bureau of Land Management |
| CDAF | Climatic Data Access Facility |
| CIRRUS | Climate Interactive Rapid Retrieval Users System |
| DAPS | Data Collection System Automated Processing System |
| DCP | Data Collection Platform |
| DEM | Digital Elevation Model |
| FOTG | Field Office Technical Guide |
| FS | USDA Forest Service |
| FTS | Forest Technology Systems Inc. |
| FWP | Fire Weather Plus |
| FWS | USDI U.S. Fish and Wildlife Service |
| GIS | Geographic Information Systems |
| GOES | Geostationary Operational Environmental Satellite |
| GOES-Next | Next-Generation Geostationary Operational Environmental Satellites |
| HAZMAT | Hazardous Material |
| IAMS | Initial Attack Management System |
| MAR | Modernization and Restructuring |
| MET | Meteorological |
| MOU | Memorandum of Understanding |
| NAGFDR | National Advisory Group for Fire Danger Rating |
| NARTC | National Advanced Resources Technology Center |
| NCC | National Computer Center |
| NCDC | National Climatic Data Center |
| NESDIS | National Environmental Satellite Data Information Service |
| NEXRAD | Next-Generation Weather Radar |
| NIFMID | National Interagency Fire Management Integrated Database |
| NIFC | National Interagency Fire Center |
| NFDRS | National Fire Danger Rating System |
| NFODL | National Fire Occurrence Data Library |
| NFWDL | National Fire Weather Data Library |
| NMC | National Meteorologic Center |
| NOAA | National Oceanic and Atmospheric Administration |

| | |
|---|---|
| NPS | USDI National Park Service |
| NWCG | National Wildlife Coordinating Group |
| NWS | National Weather Service |
| OFCM | Office of Federal Coordinator for Meteorology |
| PC | Personal Computer |
| PDT | Platform Data Table |
| PEG | PRISM Evaluation Group |
| PRISM | Precipitation-Elevation Regressions on Independent Slopes Model |
| PSW | Pacific Southwest |
| RAWS | Remote Automatic Weather Station |
| RCC | Regional Climate Center |
| RDBMS | Relational Database Management System |
| REMS | Remote Environmental Monitoring Station |
| RFC | River Forecast Center |
| RMF&RES | Rocky Mountain Forest and Range Experiment Station |
| RWU | Research Work Unit |
| SAF | Society of American Foresters |
| SCS | USDA Soil Conservation Service |
| SNOTEL | Snow Telemetry |
| SOW | State of the Weather |
| STN-ID | Station Identification |
| WIMS | Weather Information and Management System |
| WO | Washington Office |
| WRCC | Western Regional Climate Center |
| WSFO | Weather Service Forecast Office |

## NWS Modernization

The United States has launched a program to modernize the National Weather Service (NWS), a component of the National Oceanic and Atmospheric Administration of the Department of Commerce. The modernization involves new observational technology, powerful new information and forecast systems, and a new organizational structure.

The new observing systems include the WSR-88D Next Generation Weather Radar (NEXRAD), the Automated Surface Observing System (ASOS), and the Next Generation Geostationary Operational Environmental Satellites (GOES-Next). An Advanced Weather Interactive Processing System (AWIPS) will include information processing and forecast work stations at each field forecast office, as well as an interactive communications link among all the offices. Advanced supercomputers will be used to improve the timeliness and accuracy of operational numerical weather forecasts.

The new organizational structure of the NWS will involve a consolidation from the current field office structure of

- 52 Weather Service Forecast Offices (WSFO's);
- about 200 smaller offices, including Weather Service Offices and Weather Service Meteorological Observations; and
- 13 River Forecast Centers (RFC's).

The modernized structure will include

- 116 WSFO's, whose locations are determined primarily by the coverage of NEXRAD systems installed nearby;
- the 13 RFC's; and
- several hundred automated observation sites where most surface observing is expected to be assumed by the ASOS.

The modernization process is now under way. As of April 1994, over 60 NEXRAD's (WSR-88D's) and 400 ASOS's had been installed at NWS offices, and the GOES-Next satellite was successfully launched on April 13, 1994. Three to four WSR-88D's are being installed each month, with 12 expected to be commissioned by fall. A contract for the full-scale development of the AWIPS system was awarded in December 1992, with development anticipated to start in 1996.

## GOES Went!

The Geostationary Operational Environmental Satellite (GOES-I), the first of the next generation of weather satellites, was successfully launched on April 13, 1994, from Cape Canaveral Air Force Base, Florida. GOES-I officially became GOES-8 on April 27, 1994, following a successful orbit-raising maneuver placing it in geostationary orbit. The new GOES is more accurate, more sensitive, and has better resolution and greater flexibility in sounding and scanning than any of the previous satellites. The new satellite will also enhance the Data Collection Platform (DCP) program. Over 10,000 platform assignments have been made to the user community, which has been anxiously awaiting this launch for several years. The new GOES will provide forecasters greater accuracy in determining the location and severity of storms. The National Aeronautical and Space Administration will test the satellite for 6 months before turning it over to the National Oceanic and Atmospheric Administration (NOAA) for operational use in October. It will replace METEOSAT-3 at 75°W longitude. The next satellite launch (GOES-J) is scheduled for April 1995.

## NMC Supercomputer

In late 1993, the National Meteorological Center (NMC) received a new supercomputer, a Cray C90. The C90 has 16 processors, 128 megawords of memory, 200 gigabytes of disk storage, and 512 megawords of fast disk access; by contrast, the current Cray YMP8 has only about half of each. The C90 processors are approximately twice as fast for arithmetic operations as those for the Cray YMP8, which has been operating at the NMC since March 1990. The total throughput from the C90 is expected to be at least four times that of the YMP8. The power of the C90 will allow the NMC to greatly expand its model suite.

## National Data on the Move

The National Climate Data Center (NCDC) in Ashville, North Carolina, started its move to a new building in May 1994. The world's largest active archive for climate data will be housed in a new 177,000-square-foot facility located in downtown Ashville. The new building will enable the Center to manage the data more efficiently by providing better security and environmental conditions for long-term data storage. Federal regulations established by the National Archives and Records Administration and the National Institute of Standards and Technology pertaining to comprehensive magnetic tape and microforms management were followed in the design of the state-of-the-art facility, which is scheduled to be completed in July 1994.

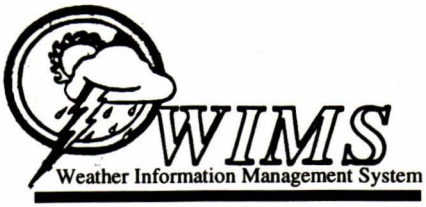
NCDC personnel will begin moving in July. The new building is scheduled to be dedicated in August or early September.

## National Weather Service Fire Weather Program


The National Weather Service fire weather program provides products and services to State and Federal land management agencies. Routine products include general presuppression and planning forecasts, red-flag watches/warnings for critical fire weather, and spot forecasts land management activities. Services include on-site support to wildfires and fire weather training and consulting for a host of ecosystem management activities.

In the future, as wildland fire managers deal with the effects of controlled and uncontrolled fires, the demand for fire weather products and services will increase. The effects of fire, related to interacting urban developments and wildland, stricter air quality regulation, and forest health problems, will add to the fire weather work load, as will requirements for more intensive ecosystem management. Users will require forecasts with greater accuracy over small aerial and temporal domains. Requests for out-of-office support will escalate as client-training activities and needs for consultation and on-site support increase.

The core forecast staff, following Advanced Weather Interactive Processing System (AWIPS) implementation, will prepare general and special fire weather forecasts. Other changes planned after AWIPS installation include restructuring fire weather districts to coincide with the WSR-88D radar umbrella and providing on-site services with fewer Air Transportable Mobile Unit qualified meteorologists. AWIPS, WSR-88D, and new observations will provide core forecasters with enhanced information and technology, enabling them to issue high-quality fire weather forecasts and warnings while mitigating impacts of the increased work load.




The Forest Service Weather and Information Management System (WIMS) was made available on the production system at the USDA's National Computer Center (NCC), located in Kansas City, on April 19, 1993.

Telecommunication links were enabled at Kansas City to allow direct communication between WIMS and the National Weather Service (NWS) via the NWS-telecommunications Gateway. WIMS accepts selected products (text/graphic), forecasts, and special fire weather forecasts sent by the NWS through the Gateway. WIMS also transmits periodic weather observation and fire danger rating bulletins back to designed NWS-offices via the Gateway at selected time intervals.

Another communication link allows WIMS to receive Remote Automatic Weather Station (RAWS) observations from the USDI Bureau of Land Management (BLM). The RAWS-data are sent via satellite from about 850 automated stations to more accurately measure the weather conditions in remote areas. These data are used in combination with 900 manual weather stations to help predict Fire Danger Rating throughout the Nation. WIMS makes all this weather data available to users in a near-real-time environment. WIMS also has the capability to accept weather observations from nonsatellite RAWS-stations via direct dial-up access.

WIMS is currently hosted on an IBM-Mainframe (3090) utilizing Oracle's Relational Database Management System and associated tools (SQL*Forms, SQL*QMX, etc.). WIMS also utilizes a transaction-based operating system (CICS) and custom menu-interface written in "C" to accommodate up to 100 concurrent users. WIMS is accessible via FTS2000 direct dial-up and/or X.25 packet-switched service to the NCC. Although any 3270-terminal emulator can communicate with WIMS, file transfer is currently supported only on the Data General minicomputer (MV-series) and the PC (using SimWare's SimPC application). Currently, there are over 1,800 logonID's issued to users from over 18 different Federal (Forest Service, NWS, BLM, National Park Service, Bureau of Indian Affairs, Fish and Wildlife Service, and the Department of Energy), State, and local agencies.

In addition, WIMS users have access to historic fire weather and occurrence data located in the National Interagency Fire Management Integrated Database (NIFMID). Historically, fire weather data collected by the Administrative Forest Fire Information Retrieval & Management System (AFFIRMS) was stored in an archaic tape library database (the National Fire Weather Data Library) at the USDA Computer Center in Fort Collins, Colorado, in order to conduct historic analysis and fire planning. This data, along with the data contained in the old National Fire Occurrence Data Library, was converted to the Oracle-based relational database structure compatible with WIMS. Users now also have direct access to their historic fire data and applications utilizing NIFMID through WIMS.

How much is WIMS being used?

*Usage on the Production System (last 15 months of operation)*

| | |
|---|---|
| Number of observations (RAWS/manual) | 4,826,636 |
| Number of NFDRS calculations | 580,962 |
| Number of trend forecasts processed | 71,978 |
| Number of RAWS extra-sensors downloaded | 9,658,650 |
| Maximum continuous days of operation—Oracle database | 100+ |
| Maximum number of concurrent users | 44 |
| Average support calls (monthly) | 150 |

Who is using WIMS?

*Logon-ID Summary*

| | WO | R1 | R2 | R3 | R4 | R5 | R6 | R8 | R9 | R10 | Research | Total |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| USDA FS | 14 | 61 | 64 | 89 | 68 | 193 | 250 | 148 | 74 | 11 | 16 | 988 |
| NWS | 2 | 6 | 3 | 5 | 5 | 12 | 17 | 14 | 8 | | | 72 |
| State | | 9 | 22 | 1 | 12 | 32 | 27 | 7 | 100 | 3 | | 213 |
| USDI BIA | | | | | | | | | | | | 78 |
| USDI BLM | | | | | | | | | | | | 237 |
| USDI NPS | | | | | | | | | | | | 225 |
| USDI FWS | | | | | | | | | | | | 44 |
| DOE | | | | | | | | | | | | 2 |
| Seasonal | | 14 | 1 | | | | 11 | 1 | | | | 27 |
| Private | | | | | | | | | | | | 38 |
| Total | 16 | 90 | 90 | 95 | 85 | 237 | 305 | 170 | 182 | 14 | 16 | 1924 |

## New National Fire Danger Rating System (NFDRS) Station Numbering

The National Weather Service (NWS) has raised an issue with the current numbering scheme for NFDRS weather stations. Currently, NFDRS uses a 6-digit number, with the first 2 digits representing the State, the next 2 the county, and the last 2 the weather station.

There are States with more than 99 counties, and there are counties with potentially more than 89 active and historic weather stations (station numbers 90–99 are "dummy stations"). The National Advisory Group for Fire Danger Rating (NAGFDR) has been asked by the National Wildfire Coordinating Group (NWCG) to review this issue and develop an action plan to solve the problem.

A working committee was formed and met March 15–16, 1994, at the Western Regional Climate Center in Reno, Nevada. The committee discussed 5 possible options and agreed to remove intelligence from the number and retain the current 6-digit number. This option would have little or no impact on existing systems outside of Weather Information and Management System (WIMS). It creates a nonintelligent key—a desirable solution that provides greater flexibility. This option will require WIMS to take control of station numbering, an important step in providing for consistent numbering between WIMS and the National Interagency Fire Management Integrated Database (NIFMID).

The following action plan was agreed upon:

1. NAGFDR will review this proposal and make a recommendation to NWCG.

2. NWCG will request the USDA Forest Service (FS) to make staff/funds available to complete these changes (or ask the FS and USDI National Park Service and Bureau of Land Management to jointly fund this effort).

3. The WIMS Steering Committee should review these proposals and make formal recommendations for changes/upgrades to WIMS.

4. The WIMS development group should update WIMS/NIFMID to accommodate the following changes during the next annual update:

    - Remove the validation rules from the current NFDRS station number in the station catalog (if any).

    - Improve the query capability for selecting stations based on characteristics in the station catalog.

    - Make weather record storage in NIFMID an attribute of the catalog. Currently, stations with numbers ending in 90–99 are not archived in NIFMID.

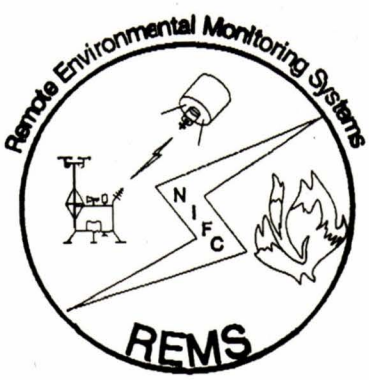
- Modify the station cataloging process in WIMS to allow the owner of a new station to request a specific 6-digit number. If it is not available, WIMS would refuse and suggest the next available number.

- Convert the existing WIMS STN-ID number from numeric to character to match NIFMID and reoptimize queries forms and reports.

- Add a function to station cataloging to force a check to see if the proposed number exists in NIFMID. If so, reuse the number and suggest the next available number.

5. NWCG will ask the NWS to capture all station catalog records from NWS Fire Weather Offices and pass this information on to the WIMS development group. The WIMS development group will create an archive of historical station catalogs in WIMS (for creating a metadata journal for NFDRS stations).

6. Changes in WIMS will be included in the WIMS annual update and completed by February 1995.




**RAWS/REMS Technology Helping Range Improvement and Noxious Weed Control**

Most noxious weeds are nonnative and were accidently brought into this country from other parts of the world. They rapidly spread and have displaced other plant species. Noxious weeds are a widespread problem throughout the western United States. Researchers from North Dakota State University estimated that direct and indirect impacts from leafy spurge in the northern Great Plains in 1990 cost over $110 million. Negative effects of noxious weeds include: loss of wildlife habitat; reduced cropland and farm production; reduced livestock grazing capacity; and diminished water quality and fish habitat. Additionally, leafy spurge plants contain a latex that, if rubbed on the face, can cause a rash around the mouth and eyes or even blindness.

Attempts are being made to reduce the spread of noxious weeds, including chemical spraying, sheep and goat grazing in leafy spurge areas, and the introduction of Biological Control Agents (BCA's). In the BCA program, natural enemies of exotic plants, such as flies, hawk moths, and flea beetles, are introduced from the country of origin. But BCA methods can be slow, taking 15 to 20 years to bring exotic plants under control. Also, in many situations, a complex of 6 to 9 BCA's are needed in order to accomplish an economic control level.

**Fishtail Site, Stillwater County, Montana**

The Fishtail Remote Environmental Monitoring Station (REMS) in Stillwater County, Montana, is a perfect example of the ability of REMS's to use a wide spectrum of data collection capabilities to allow resource managers to make better decisions. The Bureau of Land Management (BLM), working with local, State, and other Federal agencies, is attempting to understand various meteorological (MET) and soil conditions and their effects on the success or failure of BCA's. It is hoped that this undertaking will help in the reduction of noxious weeds.

The system is collecting MET data, including rain, wind speed/direction (average and peak gusts), air/fuel temperature, and relative humidity. Additional data is collected for soil moisture and soil temperature. The sensors sample data on an hourly basis and then transmit the data every three hours through the Geostationary Operational Environmental Satellite (GOES).

The Fishtail REMS is also configured to store collected data on-site in a module. This module provides the REMS with a data logging capability,

allowing the user to retrieve data periodically or for a specific event. After retrieval of the data is complete, the user can use an assortment of programs to manipulate the data. In the case of Fishtail, USDA researchers can compare soil moisture/temperature data to help evaluate effectiveness of BCA's that attack the leafy spurge root structure.

Additionally, the Stillwater County Weed Control Office felt that it was important to educate the local youth on the severe effects of noxious weeds on the region's economy. The BLM provided on-site training to a high school agriculture sciences teacher on how to retrieve data. The teacher, in turn, has used this for various projects and lessons within the classroom. Local high school students are also using Remote Automatic Weather Stations (RAWS)-generated data for physics and statistics classes. The use of computers and high-tech equipment prepares them for the future.

## Cellular RAWS Link!

During the past three months, the RAWS/REMS Program at National Interagency Fire Center (NIFC) has been working with Telular, Inc., and Handar, Inc., to enhance a Handar H540 RAWS with a cellular link called a Phonecell. To date, we have successfully retrieved digital data from a RAWS to a PC using the link. During the next few months, we will be working to incorporate synthesized speech capability into the Phonecell.

With more and more Federal frequencies vanishing, and with cellular coverage increasing almost daily, this could be a viable alternative for data retrieval. If you would like further information concerning this technology, call (208) 387-5475.

## New BLM/NIFC Address

BLM/NIFC hasn't moved—we have a new address. Please make a note of it to avoid shipping delays of RAWS equipment.

BLM/NIFC
3833 S. Development Ave.
ATTN: RAWS Support Group
Boise, ID 83705-5354

## Forest Technology System RAWS Support at NIFC??

At the request of the USDA Forest Service, BLM/NIFC is currently looking into the possibility of supporting Forest Technology Systems Inc. (FTS) equipment at NIFC. A formal report will be provided to Roger Tucker, USDA Forest Service, Washington Office.

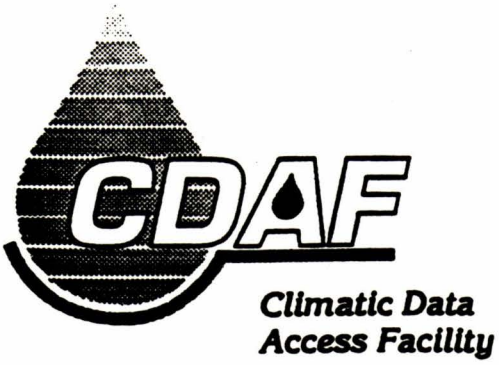
## Handar 555 DCP

The BLM/NIFC RAWS depot facility has received a 555B from Handar and is in the process of shaking and baking it. Problems that arose during initial testing involved location of fuses and an inability to force-transmit the unit, just to mention a few. Both problems are being addressed by Handar. The force-transmit problem will be a software upgrade when done. The overall programming of the 555 unit is a little intimidating. To program the unit, a minimum of 2mb of disk space is required on your PC. After the program has been built and uploaded to the 555, it will always be there, even when the power is removed. Depending on how you write the program for your unit, you might have to do no more than to turn on the power and set the clock, then go to the run mode.

The system we are testing has been running without any problems through the GOES satellite. Options such as radio speech will not be available until late 1994 or early 1995.

On May 4, 1994, Buddy Adams, Bob McCormick, and Phil Sielaff from BLM/NIFC met with Handar to discuss the 555. The meeting was very informative for both sides, and, hopefully, some of the concerns that we addressed will produce software or hardware changes.

If anyone has any questions or concerns regarding the 555, please feel free to call the RAWS staff in Boise (208-387-5475), and we will try to answer your questions.




### Climate Data Access Facility

The Soil Conservation Service (SCS) has made a commitment by creating the Climate Data Access Facility (CDAF) to work with the climate community on products that benefit all users. CDAF is grateful for this support and the cooperation we have received in making this commitment a reality.

CDAF is staffed by a meteorologist, a resource conservationist, and a computer analyst from Monday through Friday from 6:30 a.m. to 5:00 p.m. Pacific local time. The CDAF telephone number is (503) 326-4098 or (503) 326-6308 (fax).

The Centralized Database System is online 24 hours per day, 7 days per week, 365 days per year, except during quarterly 2-hour preventative maintenance.

A "computer system status" message recording is available at (503) 326-2191 with the latest system information.

### Serially Complete Daily Dataset

CDAF met with National Climatic Data Center (NCDC) representatives in October. The project plan was adjusted and a potential technique identified to complete the project.

CDAF generated a request for bid from an NCDC subcontractor to perform the task. We should know the results this spring.

## A National Inventory of Soil Climate Stations

CDAF has just concluded a joint agreement with the 6 National Oceanic and Atmospheric Administration (NOAA) Regional Climate Centers (RCC's) to locate and document soil temperature and soil moisture stations in the United States. This project supports the SCS Global Change initiative, which, in part, examines the relationship between soil moisture regimes and climate.

Inventory results have been surprising. More soil monitoring stations exist than were initially estimated or documented, especially in the West. The RCC's did an excellent job of contacting anyone (agency, State, county, university) "suspected" of collecting soil climate information. The results showed 304 soil moisture stations by State. One can see the dearth of soil moisture stations compared to soil temperature stations (1608).

In addition to station locations, the inventory includes a wide variety of metadata (data about data) such as station observation history, station ownership, sensor array, and data availability—manuscript, or dial-in to an on-line database. This inventory is on-line at CDAF and provides a valuable tool for research on climate change.

The SCS will review the inventory, determine which station records are important to the program, and work with the RCC's to retrieve the data.

## GIS Analysis and Display of Climatic Data (PRISM)

Many SCS disciplines require accurate mapping of climatic data for a wide variety of applications. Maps displaying climatic data are badly out of date (many are at least 20 years old) and are drawn with unknown or undocumented techniques. As the SCS implements natural resource legislation, potential liability is reduced by using updated climatic data and new analysis tools.

Advance computer technology allows the user to combine many physical layers, such as vegetation, soils, land use, and climate, into a single composite image. This composite image holds the future for SCS resource evaluation and management.

To create this composite image, CDAF is partnering with Oregon State University, Western State Climatologists and the Western Regional Climate Center, the National Climatic Data Center (NCDC), and the National Weather Service to analyze and implement an objective, automated technique for mapping precipitation for the United States. Specific evaluation goals are to:

a) create a Geographic Information System (GIS)-compatible climate layer for precipitation (annual, seasonal, and monthly) for each State;

b) create precipitation maps for the SCS Field Office Technical Guide (FOTG); and

c) create a "user-friendly" environment for generating GIS climate layers and maps in the SCS field offices.

This partnership is currently evaluating a mapping technique named Precipitation-Elevation Regressions on Independent Slopes Model (PRISM). PRISM was developed by Daly and Taylor of Oregon Climate Services (1992). The group of individuals participating in this evaluation are called the PRISM Evaluation Group (PEG).

PRISM is an analytical model that distributes point measurements to a regular grid on regional to continental scales. PRISM uses a digital elevation model (DEM) to estimate precipitation station elevations at the proper orographic scale. Stations are then grouped according to topographic facets, and precipitation is estimated at each DEM cell through a regression of precipitative vs. orographic elevation.

PRISM has been compared with kriging, detrended kriging, and cokriging in Oregon and has shown superior performance both quantitatively and qualitatively.

PRISM-derived annual precipitation maps with 2.5 minute resolution have been created for Idaho, Nevada, Oregon, and Utah. Initial PEG map reviews have been favorable and are currently on display at this GIS conference.

Successful representation of western precipitation will lead to similar model mapping projects for other States, many of which have not been updated for several decades. The PRISM approach has the added benefit of allowing analyses over various time periods, including monthly and seasonal averages or single months, years, or combinations of years. PRISM also has the ability to analyze other climate elements such as temperature. PRISM modeling of these elements is currently under examination by Oregon Climate Services.

## Dial an Expert

Snowfall, flood, rain, temperature records, and other short-term weather information sought by newspaper reporters, local and national television weathercasters, and the general public are now available from a group of climate centers.

A national network of 6 regional climate centers was developed in the Northeast, Southeast, Midwest, High Plains, West, and South. Because of the existence of these centers today, the agricultural, energy, transportation, construction, and tourist industries, as well as government agencies and the scientific research community, have access to better information to use as a basis for making sounder economic, environmental-protection, and conservation decisions for the 48 contiguous States, Alaska, Hawaii, and Puerto Rico.

The National Oceanic and Atmospheric Administration (NOAA) manages the Regional Climate Center (RCC) network as part of the Climate Analysis Center of the National Weather Service. Educational opportunities for students and for individuals with a special interest in climate have also been enhanced by the development of the RCC's. The centers all conduct applied research, tackling regional weather conditions, effects of climate on specific crops, and general impacts of climate change. The centers have public programs through various publications and news stories that are designed to promote the general public's understanding of regional climate and its effects on society and the environment.

The following are the 6 RCC's, their directors, and climate data request telephone number.

High Plains Climate Center, Kenneth G. Hubbard, Director.
Data Requests: (402) 472-6709.

Midwestern Climate Center, Kenneth Kunkel, Director.
Data Requests: (217) 244-8226.

Northeast Regional Climate Center, Warren Knapp, Director.
Data Requests: (607) 255-1751.

Southeast Regional Climate Center, David J. Smith, Director.
Data Requests: (803) 737-0849 or (803) 737-0850.

Southern Regional Climate Center, Robert A. Muller, Director.
Data Requests: (504) 388-5021.

Western Regional Climate Center, Dick Reinhardt, Director.
Data Requests: (702) 677-3106.

## The Move West

About one year ago, the Weather Program management negotiated a Memorandum of Understanding (MOU) with the Clearwater National Forest, Orofino, Idaho, through Region 1, for support for the National Data Collection Platform (DCP) Coordination. This function previously resided in the WO Weather Program. As the Weather Program expands and accepts new responsibilities, we are always looking for opportunities to tap talent in the field.

We are pleased to have Kolleen Shelley contribute her time, skill, and talent as the National DCP Coordinator. She has been performing national DCP coordination since spring of 1993 and has made significant contributions to the program, such as organizing the Data Collection System Automated Processing System (DAPS) interface program and leading the recent DCP Coordinator's meeting in Denver.

Kolleen started her Forest Service career as a student aide helping out in the mailroom and forest dispatch office on the Clearwater National Forest. Since then, she has worked in a variety of jobs, such as district initial attack dispatcher/receptionist, weather observer, computer assistant, aerial observer, and fire dispatch detailer in many other regions. Currently, in addition to National DCP Coordinator, she is Assistant Forest Dispatcher on the Clearwater, a capacity in which she has served since 1987. Her skills in Remote Automatic Weather Station (RAWS) maintenance, fire management, computer applications, teaching, and communications will benefit us all. We extend a belated but sincere welcome to Kolleen. WELCOME ABOARD!!

## National DCP Coordination

### A Year in Review

*Denver Meeting*—The DCP coordinators met in Denver, Colorado, February 15–16, 1994, to address program coordination and related issues. This was an opportunity for each coordinator to share information about developments in their program as well as benefit from experiences of others and presentations by cooperators and vendors.

A recurring message throughout the meeting dealt with the need for each Regional DCP Coordinator to maintain communication with field contacts in their region. Too often field staff and managers don't know who the DCP coordinator is for their Region and, as a result, don't contact them for assistance and support. Also, the participation of the DCP coordinators on interdisciplinary

committees and in program meetings such as Fire Weather and Ecosystems Management is greatly needed.

Copies of the meeting's proceedings may be obtained from Kolleen Shelley (K.Shelley:R05F01A), FTS (208) 476-4541.

*DAPS Interface*—An automated database that is user-friendly and serves as a front-end interface for updating DAPS in batch mode was implemented this spring. This is a screen entry system that requests all entries required by DAPS for PDT information, as well as agency-specific information and maintenance tracking. With each change made to the database that corresponds to DAPS needs, the system automatically generates a file that can be batch loaded via PC-modem to DAPS. Thus, users will only "see" one set of information, and be able to keep it up to date via the user-friendly (nonsyntax-specific) system. Each regional DCP coordinator is charged with keeping the Oracle database current with input from their field maintenance people. Monthly, or more often if necessary, the National Coordinator will query the database for any changes that have occurred since last batch update. All recent updates will be batch dumped to DAPS from this query, and copy will be submitted to BLM. This should eliminate the necessity of duplicate record keeping and help the FS keep its portion of the DAPS database current.

## New DCP Coordinators

Steve Makowski (S.Makowski:R03A) is now performing DCP coordination for Region 3. Bob Lee (B.Lee:R03A) is the alternate. Any activity affecting Region 3's RAWS/DCP's should be coordinated through Steve or Bob, FTS (505) 842-3473.

Neal Wurschmidt (N.Wurschmidt:R06F08A) is the new alternate for Region 6. Please contact Neal or Jim Brain (J.Brain:R6/PNW), FTS (503) 326-5437, regarding RAWS/DCP's in Region 6.

Welcome aboard Steve, Bob, and Neal.

## REGION 1

In July 1992, the directors of Range/Air/Watershed/Ecology and Aviation/Fire Management formed a regional weather information management coordinating committee. The objective of the weather committee is to identify and coordinate Region 1 weather information sources, needs, and applications for all resources. The weather committee includes regional and forest fire managers, forest hydrologists, air quality specialists, avalanche experts, ecologists, research experts in weather and climatological information applied to resource management, Weather Information and Management System (WIMS) support experts, Remote Automatic Weather Station (RAWS) experts, Soil Conservation Service (SCS) Snow Telemetry (SNOTEL) and water supply specialists, National Weather Service (NWS) weather forecasters, and Bureau of Land Management (BLM) fire weather and environmental monitoring experts. Meetings have occurred in August 1992, January 1993, April 1993, November 1993, and March 1994. The next weather committee meeting was scheduled for May 24, 1994.

A dynamic "Sources of Weather Information" document was written and incorporated into the Region 1 Air Resource Management Program. Kelly Redmond, from the Western Regional Climate Center, attended one of the weather committee meetings and assisted in critical review of the weather information sources.

Regional Range, Air, Watershed, and Ecology funding is supporting development of Geographic Information Systems (GIS) maps of precipitation information for Idaho and Montana. An Oregon State University model, called Precipitation-Elevation Regressions on Independent Slopes Model (PRISM), shows good agreement with current Idaho precipitation maps developed by Myron Molnau at the University of Idaho. Montana precipitation maps are being updated to current 30-year averages and adapted to GIS using the PRISM model. Average annual precipitation as well as seasonal and average monthly values will be available through the SCS.

A Regional GIS map of weather stations is being developed by Bob Keane at Intermountain Fire Sciences Lab. Weather stations are geographically displayed in various ways to assist in determining regional weather information needs.

Steve Running and his group at the University of Montana are assisting in development of Region 1 GIS climatic information for ecosystem modeling and management. Peter Thornton presented a paper at the Weather and Climate Applications for Resource Management course in Marana, in which he outlined the University of Montana's regional hydrologic ecosystem simulation modeling.

## REGION 4

The Region 4 attendees at the Weather and Climate Applications for Resource Management course were pleased with the course and instructors. We hope it will be given again next year. The course fits right in with ecosystem management, and the interagency scope provided the networking and collaboration we need to continue. Soils, Hydrology, Ecology, Geology, Fisheries, Fire, and Planning are just a few who benefit. Environmental Engineers in the Society of American Foresters has approved a meteorology/climatology working group. Several Forest Service staff are charter members of this group, including: Clif Benoit (R-4), Sue Ferguson (R-6), Robert Hammer (R-1), Linda Joyce (RMF&RES), Howard Roose (R-1), Harold Thistle (R-1), Jerome Thomas (R-9), and Roger Tucker (WO). Objectives are being developed and will include technology transfer, research needs, educational guidelines, state of the science, and integration of expertise into ecosystem management and related science.

The recent "Buyout" program has begun to impact programs. The lost expertise in smoke management, RAWS operation and maintenance, and forest/weather climate expertise will affect quality and highlights the importance of keeping our training funded.

## REGION 6

### Wallowa-Whitman National Forest Begins Watershed Analysis Effort

In response to Chief Jack Ward Thomas' direction to emphasize ecosystem management and the accelerating concerns surrounding aquatic and riparian resources, the Wallowa-Whitman National Forest will begin a forestwide watershed analysis program.

Watersheds selected for analysis this year include North Fork Burnt River (on the Unity Ranger District), Upper Grande Ronde (on the La Grande Ranger District), and Upper Joseph Creek (on the Wallowa Valley Ranger District). These watersheds were selected due to the high level of public interest in these areas.

"Watershed Analysis is an important step in the implementation of ecosystem management. It will provide a scientific assessment of biological and physical processes in the watershed. This will help determine where potential projects may be needed in coming years to restore watershed health," said Forest Supervisor Bob Richmond.

Since natural ecosystems and watersheds do not follow administrative or land ownership boundaries, watershed analysis will be an interagency effort. The Forest Service will work closely with the Bureau of Land Management, Soil Conservation Service, and several State agencies to obtain and share information about each of the watersheds. These agencies will also be seeking information from private landowners within each of the watersheds, as well as from the public, about historic land use patterns.

Watershed analysis is not a decision-making process for Federal land management agencies. It will, however, provide land managers with biological and physical information within and surrounding a watershed, which will be useful in future planning efforts.

If you would like to receive additional information or discuss the watershed analysis project, please contact Steve Howes, Watershed Core Team Leader, at (503) 523-1474, or Sandy Mitchell, Watershed Public Affairs, at (503) 523-1472.

## REGION 9

### Vermont Weather Data Coordination Meeting

On April 1, 1994, the Vermont Department of Forests, Parks, and Recreation hosted the "Vermont Weather Data Coordination" meeting in Waterbury, Vermont. The purpose of the meeting was to bring weather data users and collectors together. This gathering allowed for sharing of information, identifying needs, and planning actions for the future, all to improve the collection, distribution, and use of weather data in Vermont. More than 30 interested people attended, representing several State, Federal, and private organizations, including the National Weather Service, the University of Vermont, the Vermont Agency of Natural Resources, the Green Mountain National Forest, the Army Corps of Engineers, and the Vermont Agency of Transportation. Prior to this meeting, the Vermont Forestry Division conducted a survey of weather data collectors and users. This information was entered into a database showing the distribution of data being collected and the overlaps. This highly motivated group prioritized strategies to improve data collection, storage, and use. As a result, task groups were formed to work on projects such as developing a coordinating committee and creating a central weather data warehouse. There will be a followup meeting in 6 months to hear task group reports and make decisions for the future!

## Vermont Fire Weather Meeting

On April 8, 1994, the National Weather Service (NWS) office in Burlington, Vermont, hosted a meeting to discuss fire weather monitoring in Vermont. The participants included representatives from the Green Mountain National Forest, the Vermont Department of Forests, Parks, and Recreation, and the NWS. This meeting allowed the group to meet Jeff Osiensky, our new Fire Weather Forecaster from Boston, and hear details on operations and services provided under his leadership. It also helped the Burlington NWS office understand what fire weather forecasting involves. This office will eventually be providing that service for Vermont. Members of the group shared information on their prescribed burn programs and fire weather data needs. Strategies to improve our fire weather monitoring system and use of data were developed and prioritized. Task groups were formed and decisions were made to better our understanding, use, and collection of fire weather data. This group meets annually to critique performance during the past year and assess fire weather needs for the upcoming season.

For more information, contact:
Nathan Fice, Forest Protection Tech.
Vermont Department of F.P.&R.
RR 1, Box 1940
Manchester Ctr., VT 05255-9733
(802) 362-5533
(802) 362-1251 (fax)

## Pacific Southwest Station News

The Pacific Southwest (PSW) Research Station's monthly fire weather outlooks are now available via modem. The outlooks consist of five color maps, two tables, and a narrative discussion. The color maps are in GIF format. Shareware programs to display and print the color maps using either DOS or Windows are also available for downloading. The forecasts are updated by the PSW Riverside Fire Laboratory's Fire Meteorology Research Work Unit (RWU) shortly after the 1st and 15th days of each month. The telephone number of the fire weather outlook computer system is (909) 276-6563. Communication parameters are 8 data bits, no parity, and 1 stop bit. Transmission rates of 300 to 9600 baud are supported. The forecasts may be downloaded using X-modem, Y-Modem, or Z-modem protocols. For more information, contact Francis Fujioka at (909) 276-6569.

UNESCO

INTERNATIONAL GLOSSARY OF HYDROLOGY

Second Edition

This quintessential publication in the field of hydrology contains nearly 1800 terms on English, French, Russian, and Spanish, with their definitions, alphabetical indexes, and the Universal Decimal Classification for hydrology. While the title of the publication remains the same as that of the first edition published in 1974, the content has been expanded to include new and scientific developments, such as the greater use of remote sensing. Although its emphasis remains on surface water and groundwater hydrology, this new edition reflects the broader scope of WMO's and UNESCO's programs in hydrology and water resources.

WMO

1992: softbound, 413 pp. $67, includes shipping and handling. Please send prepaid orders to: WMO Publications Center, American Meteorological Society, 45 Beacon Street, Boston, MA 02108-3693. (Orders from U.S. and Canada only).

## Western Climate Information System: Wesclim

The mission of the Western Regional Climate Center (WRCC) is to:

- disseminate high-quality climate data and information pertaining to the western United States;
- foster better use of this information in decision making;
- conduct applied research related to climate issues; and
- improve the coordination of climate-related activities at State, regional, and national levels.

A major component of the mission of the Western Regional Climate Center is the dissemination of climate information for management and decision making in the western United States. One mode of information distribution is through Wesclim, a menu-driven computer-based information access system. It accesses a regional remotely accessible on-line database. The regional coverage is western United States (MT, WY, CO, NM, ID, WA, OR, NV, AZ, CA, AK, HI, Pacific Islands) for all products, and the entire United States for hourly weather.

### Sources of Information:

NOAA (National Climatic Data Center, National Weather Service, Climate Analysis Center), USDI Bureau of Land Management, USDA Forest Service, USDA Soil Conservation Service, state climate offices, and others.

### Type of Data Sets and Period of Coverage:

*NOAA Cooperative Climate Network.* Historical daily observations for the above 14 states from about 6,100 stations, of which about 2,600 are current. Updated monthly to within the past 2–3 months.

*NOAA and FAA Hourly Surface Airways Observations.* All stations in the 50 States, all hours, for approximately the past 2–3 years. Upper air observations for the past 2–3 years in operational code. National Weather Service products from Area Offices in the West for the past 7 days. National Weather Service products (forecasts, watches, warnings, reports, observations) for all cities in the U.S. and Canada for the past 24 hours, current to within a few minutes.

*RAWS (Remote Automatic Weather Stations), Bureau of Land Management, Forest Service.* Hourly meteorological data for approximately 600 remote sites in the West, period of record (1985 or later) through the past few minutes.

*SNOTEL (Snowpack Telemetry), Soil Conservation Service.* Daily measurements of snowpack, precipitation, and temperature from 550–600 remote elevated sites in the West. On-line since September 1993.

*Station Histories and Listings.* For each major network.

### Data Manipulation

*Types of Analyses.* Simple listings of data. Manipulation and analysis to determine averages, extremes, and variability.

*User flexibility.* Most analysis software allows the user considerable freedom in selecting data intervals, date windows, thresholds, decisions about missing data, output, etc.

*Utilities.* Examine directories, download or list files, send mail, and others.

### Cost

Wesclim is a subscription-based system. Portions of the menu system are available at no cost. A nonrefundable set-up charge of $75 is applied toward subsequent use of the system. Charges are determined by resource usage and connect time. Typical moderate use of the system results in charges of $15–20 per hour. Basic connect cost is $0.20 per minute or $12 per hour.

### Access

Users may reach Wesclim via modem with dial-up lines or via network connections such as Internet. Incoming lines are available at 1,200, 2,400, 9,600, and 14,400 baud. Each user is assigned an account name and password, and allocated 5 megabytes of disk space. Corporate users may access the same account from multiple cities. When account balances dwindle to zero, the account will be declared inactive and further access will not be allowed until a deposit is made to the account.

### How to Learn More

Contact WRCC at (702) 677-3106 or (702) 677-3157 (fax).

## CIRRUS

The Climate Interactive Rapid Retrieval Users System (CIRRUS) was developed and is maintained by the Southeast Regional Climate Center (Southeast RCC). The Southeast RCC is funded by a grant from the National Weather Service (NWS) to the South Carolina Department of National Resources. CIRRUS is a computer-based information system that allows easy access to a variety of climate products. Data and information come from the NWS weather wire, the Climate Analysis Center, the National Climate Data Center, and state weather networks. The goal of CIRRUS is to provide the best economically and environmentally important climatic information in a timely and easy-to-access manner. CIRRUS was developed for use by farm producers, families, teachers, business and insurance professionals, the media, researchers, and others interested in current and historical climate data and information.

For more information about CIRRUS and how to access it, call the Southeast RCC at (803) 737-0849 or (803) 765-9080 (fax).

## Fire Weather Summit Held in Santa Monica

An Intergovernmental Fire Weather Users Summit was held in Santa Monica, California, April 13–14, 1994. The summit was sponsored by the National Weather Service (NWS) and the National Fire Weather Advisory Group and was attended by representatives of 13 Federal, State, and local agencies.

A luncheon address was provided by Patrick L. Patterson, Executive Director of the Congressional Fire Services Institute. Also in attendance was Dave Hackett, of Congressman Curt Weldon's (R-PA) office.

The purpose of the summit was to provide a forum for discussion of changing needs among users of Fire Weather products. Topics of discussion included the role of fire in ecosystem management, the Southern California wildfires of 1993, the NWS modernization, smoke management, the urban/wildland interface, and weather-related fire research.

Lessons learned at the summit will help NWS managers to plan for the future of the Fire Weather Program. Among these are the need for a nationwide, year-round Fire Weather Program. Increased prescribed burning for reduction of fire hazards and ecosystem management will require more spot forecasts from NWS offices. At the same time, increased pressure for clean air will require more precise forecasting for smoke management.

The fire management community has led the way in interagency cooperation. The Intergovernmental Fire Weather Users Summit was a good example of this type of cooperation. The NWS seeks to continue to strengthen its partnership with other agencies throughout the modernization era and into the 21st century.

A written report on the results of the summit is being prepared. If you would like to receive a copy of this report, please contact Jeanne Hoadley at NWS headquarters, (301) 713-1677.

## Drought Conference

The Drought Management in a Changing West: New Directions for Water Policy Conference was held in Portland, Oregon, May 11–13, 1994. Conference hosts were Western Regional Climate Center, Desert Research Institute; West National Technical Center, USDA Soil Conservation Service; and International Drought Information Center, University of Nebraska-Lincoln. The conference was well attended and very productive. All attendees participated in one of the seven working groups. Each working group focused on a specific set of questions and made recommendations. The groups reported their findings to all attendees on Friday morning. The preamble for the working group questions was:

"Population growth, recurrent drought, growing awareness of the necessity of preserving and restoring the environment, and a host of other factors have raised serious questions about the sustainability of current natural resources use and management systems in the West. As we look to the future, it is readily apparent that we must develop a new paradigm that allows society to coexist with the natural and biological environment. To define this new paradigm represents a significant challenge, but one that offers enormous opportunities. The future requires new initiatives, including increased coordination and cooperation between levels of government and partnerships with the private sector."

There was a good mix of papers and working group participation at the 3-day conference. Federal, State, and local agencies were all well represented. Presentations and discussions were centered around such topics as:

- the challenges and opportunities of drought management in the West,
- forecasting drought status and future prospects for the West,
- integrating drought management with western water policy,
- drought mitigation and preparedness from national, regional, State, and local perspectives, and
- the threats and opportunities of managing change.

James R. Lyons, Assistant Secretary, Natural Resources and Environment, USDA, gave a very interesting and thought-provoking luncheon keynote address. During the question-and-answer period, Mr. Lyons stressed the need for Federal, State, and local officials to work together on water, drought, and other issues to solve the problems. He quoted from the Nike commercial: "Just do it."

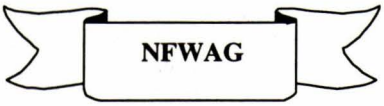
The conference was very successful, and a comprehensive proceedings document will be prepared and distributed by early fall of this year. For more information about the conference or requests for the conference proceedings, contact Dr. Donald A. Wilhite, Director, International Drought Information Center, University of Nebraska-Lincoln (402) 472-3679 or (402) 472-6614 (fax).

## Predrought Management Conference Workshops

Two preconference workshops were held on May 10, 1994, by invitation only. Participation was limited to 15–25 individuals. The workshop on the need for a national drought center or regional centers concluded that they did not have sufficient information to make such a decision. A questionnaire will be prepared and mailed to generate the information necessary for such a decision.

The second workshop was on integrated climate monitoring in the West. The goal was to improve the process that provides decision makers with climate information required for effective drought mitigation in the West. The results of a preworkshop questionnaire were discussed, along with the status of major western databases. No single weather and climate network observed by Federal, regional, State, and local agencies provides all the necessary information to sufficiently characterize the wide variety of climate behavior in the region. These networks are managed separately by each agency, and there has been little coordination in their management. Also, the degree of access to current and historical information varies widely from one network to another. To better assess conditions in the West, the workshop participants agreed to the need for an Integrated Climate Monitoring System in the West. The system characteristics were also defined. To show their dedication to this, the participants signed an "intent to cooperate" document. Further action items were:

- documenting workshop and conference findings for the proceedings;
- preparing a succinct summary for management endorsement; and
- developing an implementation plan by forming a committee to do it and meeting and developing the plan/proposal and a vision statement based on conference documentation.




## Meeting Summary

The National Fire Weather Advisory Group met April 11–12, 1994, in Santa Monica, California. The meeting was held in conjunction with its sponsorship of the Fire Weather Users Summit of April 13–14, 1994 (separate article). The members and technical advisors are from Federal and State fire agencies. The new officers are Jim Travers of the National Weather Service (NWS) as Chairperson and Fred Robinson of Oregon's Forest Protection Division as Vice Chairperson. The Group has had a busy and productive year. Some of the key issues being dealt with are:

- sponsorship of the April 13–14, 1994, Fire Weather Users Summit;
- coordination of the purchase of 22 MICRO-Remote Automatic Weather Station (RAWS) replacements for the NWS Air Transportable Mobile Units;
- coordination of the Fire Weather Risk Reduction Project in Boise, Idaho;
- core and incident meteorologist training needs; and
- standards for weather stations.

## Weather Station Standards

Bad data are getting into the weather/climate databases due to poorly maintained stations. Standards need to be set for quality control and maintenance. The USDI Bureau of Land Management (BLM) has established and documented guidelines. There is also the Weather Station Handbook—An Interagency Guide for Wildland Managers, published March 1990 in coordination with BLM, USDI National Part Service (NPS), and USDA Forest Service (FS). The National Fire Weather Advisory Group agreed to take on the responsibility of establishing weather station standards and guidelines. Gardner Ferry of BLM will take the lead by coordinating with Skip Wright, Federal Coordinator for Meteorology, on his assistance through one of the Office of Federal Coordinator for Meteorology (OFCM) Committees in developing a standards document. It will be a OFCM publication based on the BLM guidelines and the above-named document.

## Fire Weather Risk Reduction Project

A Fire Weather Risk Reduction Project is planned for the Weather Service Forecast Office (WSFO) Boise. The purpose of the project is to smooth the transition to modernized fire weather forecast operations. Core forecasters, who will assume responsibility for fire weather products previously prepared by dedicated fire weather forecasters or focal points, must have the necessary tools and training to assume their new responsibilities. In addition, land management agencies must be assured that National Weather Service (NWS) products and services will continue to meet their evolving needs.

WSFO Boise was chosen for the project because of its:

- early WSR-88D at a fire weather office in mountainous terrain,
- comprehensive fire weather program and experienced staff, and
- collocation with the National Interagency Fire Center, which includes a sophisticated and diverse user group.

Objectives of the Boise Fire Weather Risk Reduction Project include:

- developing techniques to take advantage of Modernization and Restructuring (MAR) technology and related scientific advances to satisfy NWS fire-weather user requirements and enhance services;
- developing procedures to mitigate effects on users resulting from restructured NWS office responsibilities, changes in forecast district/zone boundaries, and/or fragmenting land management administrative boundaries;
- involving users and assessing product quality and consistency resulting from the preparation of fire weather forecasts by core forecasters; and
- determining core-forecaster fire weather training requirements to ensure timely, accurate, and useful routine and nonroutine products.

An interagency user assessment team was established to evaluate and set a baseline for current products and services, provide advice for future products, facilitate project execution by coordinating information with its member agencies, and critically evaluate new products and forecasts prepared by core forecasters.

After core forecasters complete fire weather and fire behavior training and develop specific forecast aids, they will begin preparing test fire weather forecasts for part of the Boise fire weather district. These forecasts will be archived for objective and subjective evaluation. The content and format of the products will be evaluated in cooperation with the User Assessment Team.

In later stages of the project, core forecasters will assume responsibility for verbal fire weather briefings and spot forecasts. The User Assessment Team will help formulate methods for evaluating these additional products and services.

A two-phase, four-year work plan outlines the Fire Weather Risk Reduction Project. During the second phase, one or more NWS offices with spin-up fire weather responsibility will test developed products and procedures. Much of the developments should be applicable to other NWS programs, such as agriculture and hazardous material (HAZMAT) support.

## SAF Forest Meteorology Working Group

David R. Miller, Associate Director, Northeast Regional Climate Center (University of Connecticut), reports that the Society of American Foresters (SAF) executive committee has approved the Forest Meteorology/Climatology working group. The initial membership list has been compiled. The group needs to meet, pick its officers, take part in the SAF annual meeting, and decide its agenda.

Working Group Objectives:

1. Establish educational guidelines in forest meteorology and climatology.

2. Undertake a comprehensive organization of the pertinent knowledge of forest-atmosphere processes from the various scientific disciplines.

3. Define and encourage technological applications of forest meteorology and climatology.

4. Define research needs in forest meteorology and climatology.

5. Supply SAF expertise in the forest-climate change debate.

## Diamond Anniversary

The American Meteorological Society will have its 75th Annual (diamond anniversary) meeting and 11 associated conferences and symposiums January 15–20, 1995, in Dallas, Texas. This should be one of its largest gatherings, and where better to do this than in Texas.

## January's Arctic Outbreak

The first month of 1994 contributed several pages to the geophysical record books of the United States. It was both warm and cold. In the Northwest, Washington and Idaho had their second warmest January in 100 years. In the Northeast, New York and Maine had their coldest January in 100 years. The Washington, DC, area recorded its eighth coldest January in 100 years.

**All-Time Record Lows**

| | |
|---|---|
| January 19, 1994 | |
| New Whiteland, IN | −35°F* |
| Indianapolis, IN | −27°F |
| Akron, OH | −25°F |
| Clarksburg, WV | −25°F |
| Zanesville, OH | −25°F |
| Columbus, OH | −22°F |
| Pittsburgh, PA | −22°F |
| Youngstown, OH | −22°F |
| Mansfield, OH | −22°F |
| Cleveland, OH | −20°F |
| State College, PA | −20°F |
| Erie, PA | −18°F |
| Jackson, KY | −18°F |
| January 21, 1994 | |
| Harrisburg, PA | −22°F |
| Scranton, PA | −21°F |
| Williamsport, PA | −20°F |
| Allentown, PA | −15°F |

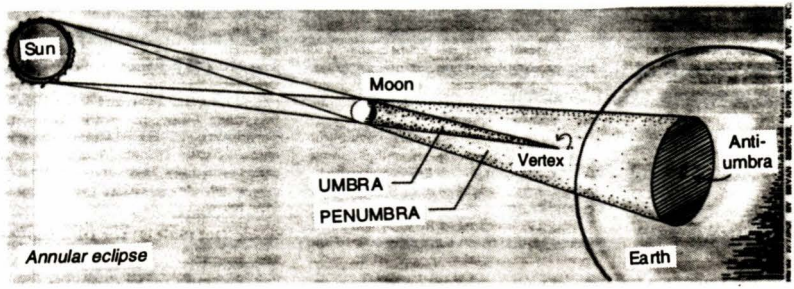
**Lowest Temperature by Day**

| | | |
|---|---|---|
| Jan 13 | −23°F | International Falls, MN |
| Jan 14 | −29°F | Duluth, MN |
| Jan 15 | −41°F | Park Rapids, MN |
| Jan 16 | −43°F | Watertown, NY |
| Jan 17 | −32°F | Garrison, MN |
| Jan 18 | −44°F | Tyler, MN |
| Jan 19 | −52°F | Amasa, MN |
| Jan 20 | −57°F | Rangeley, ME |
| Jan 21 | −40°F | Grafton, NH |
| | | Livermore Falls, ME |
| Jan 22 | −11°F | Gunnison, CO |
| Jan 23 | −29°F | Houlton, ME |
| Jan 24 | −24°F | Houlton, ME |
| Jan 25 | −27°F | Houlton, ME |
| Jan 26 | −31°F | Caribou, ME |
| Jan 27 | −48°F | Crown Point, NY |
| Jan 28 | −9°F | Houlton, ME |
| Jan 29 | −27°F | Devil's Lake, ND |
| Jan 30 | −39°F | Ely, MN |
| Jan 31 | −41°F | Faribault, MN |

* State record
** tied station record

## Annular Eclipse—Ring of Fire

If you missed viewing the annular eclipse on May 10, 1994, you will have to wait until May 20, 2012. At this time, an annular eclipse will pass just south of the Aleutians, come ashore over northern California and southwestern Oregon, and end at sunset over northern Texas. Should you still be around on August 21, 2017, you will have the opportunity to view the first total solar eclipse for the United States since 1991, and the first for the contiguous States since 1979. It will cover a 70-mile-wide path from Salem, Oregon, to Charleston, South Carolina, going coast to coast from midmorning to early afternoon. The total eclipse produces total darkness as the moon's umbral shadow rushes in. You may be able to view some of the brighter stars and planets. In an annular eclipse, the ring of still visible sunlight usually drowns out the glow of the corona. The moon covers all but a blinding ring of the sun. At sunset on January 4, 1992, the annular eclipse appeared to be a ring of fire dipping beyond the horizon of southern California.



*Annular eclipse*

## Spring Has Historically Brought Severe Weather

The outbreak of tornadoes on March 27, 1994, was the second "Palm Sunday Outbreak" in the past 30 years. On April 11, 1965, severe thunderstorms in the upper Midwest generated 47 tornadoes that killed 257 persons and caused more than $200 million in damage. On March 28, 1984, 22 tornadoes hit the Carolinas, killing 60 persons and injuring 1,182 others. One of the tornadoes was 2.5 miles wide at times. Another notable March storm affecting several southeastern States was one of history's most remarkable. On March 21, 1932, tornadoes struck Alabama, Georgia, Mississippi, and Tennessee, killing 321 and injuring 1,874. Possibly one of the most devastating tornado outbreaks in history occurred on April 3–4, 1974. This "Super Outbreak" produced the largest number of tornadoes, affected the greatest geographical area, inflicted the most damage in dollar figures, and ranks sixth in number of deaths of all tornado outbreaks on record. The incredible figures for this outbreak include 144 tornadoes in 13 States and Canada, 307 deaths, and a total of $500 million in property loss. Obviously, spring is the time of the year to be aware that severe and dangerous weather can occur, and to be prepared to take necessary action if the weather suddenly turns destructive. Unfortunately, tornadoes can occur in all months of the year across the Southwest, but are usually most numerous in March, April, and May.

## Billion-Dollar U.S. Weather Disasters, 1980–93

The Research Customer Service Group, National Climate Data Center, has compiled a list of weather-related disasters that produced damages exceeding $1.0 billion. The past six years alone have produced 9 weather-related disasters with estimated costs exceeding $92.4 billion.

| |
|---|
| *California Wildfires*, fall 1993. Southern California. At least $1.0 billion in damage/costs. 4 deaths. |
| *Severe Flood*, summer 1993. Central United States. Estimated $12.0 billion in damage/costs. About 48 deaths. |
| *Drought/Heat Wave*, summer 1993. Southeastern United States. Estimated $1.0 billion in damage/costs. Death toll undetermined. |
| *Storm/Blizzard*, March 1993. Eastern United States. Over $3.0 billion in damage/costs. Estimated 270 deaths. |
| *Hurricane Iniki*, September 1992. Hawaiian Island of Kauai. About $1.8 billion in damage/costs. 6 deaths. |
| *Hurricane Andrew*, August 1992. Florida and Louisiana. About $25.0 billion in damage/costs. 58 deaths. |
| *Hurricane Bob*, August 1991. Mainly coastal North Carolina, Long Island, and New England. $1.5 billion in damage/costs. 18 deaths. |
| *Hurricane Hugo*, September 1989. North and South Carolina. $7.1 billion in damage/costs. 57 deaths. |
| *Drought/Heat Wave*, Summer 1988. Central and eastern United States. Estimated $40.0 billion in damage/costs. Estimated 5,000 to 10,000 deaths. |
| *Hurricane Juan*, October–November 1985. Louisiana and southeastern United States. $1.5 billion in damage/costs. 63 deaths. |
| *Hurricane Elena*, August–September 1985. Florida to Louisiana. $1.3 billion in damage/costs. 4 deaths. |
| *Hurricane Alicia*, August 1983. Texas. $2.0 billion in damage/costs. 21 deaths. |
| *Drought/Heat Wave*, June–September 1980. Central and eastern United States. Estimated $20 billion in damage/costs. Estimated 1,300 deaths. |

## NFDRC Codes With a Personal Computer

Forest Technology Systems Inc. (FTS) and the company REMSOFT have designed a simple computer program called the National Fire Danger Rating System (NFDRS)-78 Module, which will automatically convert collected fire weather parameters to NFDRS fire indices. All levels of fire personnel now have fast, local access to NFDRS codes.

Designed for use with the FWS-11 fire weather station and FTS's fire weather software, Fire Weather Plus (FWP), NFDRS-78 will operate on any IBM or compatible PC. This module automatically converts weather parameters to NFDRS codes and updates them as new weather data are collected. Manual data entry and NFDRS fire code calculations are easily accomplished for sites not equipped with an FWS-11 weather station.

To calculate codes, the user selects an NFDRS template for each weather station. Modeling information for each station is entered into that template. Choices are made from four different fields:

1. climate class (4 classes),
2. fuel model (20 types),
3. herbaceous fuel type (2 types), and
4. slope class (5 classes).

Codes are then calculated, and available for display with FWP. The input modeling data can be changed at any time.

The "State of the Weather" (SOW) is provided automatically using the current weather data from within FWP. A user can easily override the calculated value for SOW by manually entering a value, which triggers an automatic recalculation of the codes. This essentially allows the user to ask, "What if...?"

The FWP system software allows the user to see the data on screen, plotted, graphed, or printed, in the same manner as all other FWP information. Indices for different sites can be graphed together to simplify comparisons. Codes can also be calculated on an hourly basis, rather than only at the daily observation time of 13:00 hours. This feature is particularly useful for effective prescribed-burn planning.

The NFDRS-78 module was written and tested in conjunction with the Missoula Fire Research Lab in Montana. If a user requires forecasted NFDRS fire codes, a Forecast Module is also available for use with FWP.

For more information, contact Forest Technology Systems, (800) 548-4264.

## HANDAR News

### New Fuel Moisture Sensor

In 1993, we developed a completely new fuel moisture stick that will offer both improved accuracy and drift characteristics as well as a reduced cost for replacement elements. The sensor has been under test by the California Department of Forestry since summer 1993. The USDI Bureau of Land Management (BLM) will begin a four season test this spring.

### New GOES Radio Certified by NESDIS

Last August, our new 100 baud GOES radio for the 555 DCP was certified by NESDIS. It features programmable channel frequencies and solid state design using many fewer parts than our older GOES transmitters. We will continue to test 100 percent of the transmitters and DCP's we make over temperature.

### New 555 DCP

Our new single board DCP, the 555, has been in production for 2 years and over 700 of these new systems have been shipped. It is available in the same enclosure as the 540 with a similar sensor connection panel. The main difference is more connectors and spare slots since the 555 has more standard sensor inputs. Most of your existing RAWS sensors and cables can be interfaced to the new DCP. The 555 Data Acquisition Board also comes with a 5-year warranty.

### Free Demo Software

If you would like to check out the 555 programming software, we have FREE demo disks and quick start manuals available.

### RAWS Seminars

We are currently planning regional RAWS seminars across the country. Please let us know if you are interested in participating.

### Catalog

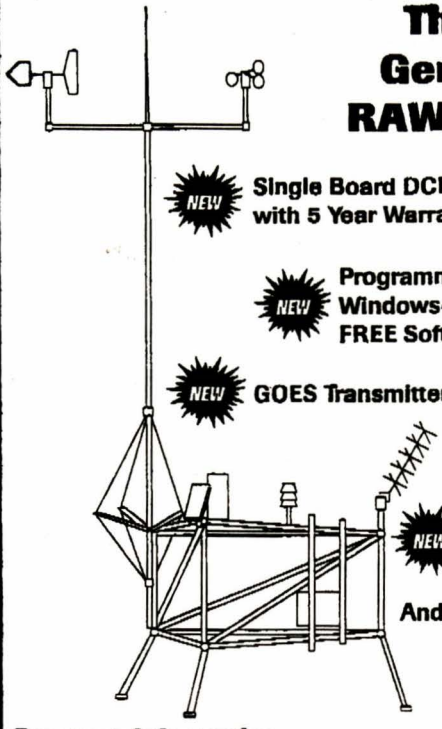
We published and mailed a new 200-page catalog in February. If you did not receive a copy or if you know someone else who would like one, please call us.

## Move

We moved to a new facility in January. Please note our new address is 1288 Reamwood Avenue, Sunnyvale, CA 94089-2233. The phone numbers are the same: 1-800-955-REMS or our direct line, (408) 734-9646. The fax number is (408) 734-0655.

If you would like more information on the next generation RAWS or you would like to request any materials mentioned in this bulletin, please contact Janet Yokobata-Ando (ext. 334).

# The Next Generation RAWS is here!



NEW Single Board DCP – the 555 with 5 Year Warranty

NEW Programming Capability
Windows-Like Software
FREE Software and Upgrades

NEW GOES Transmitter

NEW Fuel Moisture Sensor

And much more!

***For more Information***
***Call 800-955-7367, ext. 334***
***Janet Yokobata-Ando***

Handar

## Campbell Scientific

Campbell Scientific is a major supplier of automated, remote data acquisition systems. Our systems feature flexibility, proven reliability, rugged construction, and competitive price. System flexibility allows a single station to monitor parameters useful in fire weather, environmental, meteorological, and water quality applications.

Many new products have been introduced recently:

- Weather station tripods are available in heights of 6, 10, and 20 feet; towers are available in heights of 3 and 10 meters.
- TGT1 GOES Satellite Transmitter supports transmission from remote sites.
- VS1 telephone modem supports voice-synthesized speech (now your datalogger can talk to you).
- DC1765 Cellular telephone package for remote datalogger sites in the United States.
- ID-2000 graphics software supports quick, easy graphics and data analysis.
- DB1 Double Bubbler a self-calibrating system that measures water level (or other liquids).
- 247-L and 247W-L probes measure the electrical conductivity and temperature of water.
- RTMS a multi-tasking software package that supports automated, real-time data acquisition, graphical monitoring, and control of Campbell Scientific CR10T datalogger networks.
- CSM1 and MCR1 Card Storage Module and Reader offer removable, easily transported, credit card-sized memory cards to store the datalogger's data and programs.

To discuss these products or your application needs, please call Campbell Scientific, Inc., in Logan, Utah, at (801) 753-2342 or (801) 752-3268 (fax).

## Weather and Climate Applications for Resource Management

National Advanced Resource Technology Center

**April 18–22, 1994**
**Marana, Arizona**

A new interagency course was offered at the National Advanced Resource Technology Center (NARTC) in Marana, Arizona, April 18–22, 1994.

Approximately 50 students representing the USDI Bureau of Land Management (BLM) and Bureau of Indian Affairs (BIA) and the USDA Forest Service (FS), Soil Conservation Service (SCS), and Agricultural Research Service (ARS) attended from all over the United States.

The faculty consisted of representatives from the National Weather Service (NWS), FS, BLM, SCS, Western Regional Climate Center, Snowcap Hydrology, and ARS.

The course was designed for Federal and State resource managers and specialists who need weather and climate information in making management decisions. The participants were provided skills and tools to improve the integration of weather and climate data into their agencies programs and for project planning.

The course started with the basics of weather and climate, covering "real time," near-real time, and historical data; the difference between modeled data and recorded or observed data; the various levels of weather and climate data storage and use from international to local organizations responsible for gathering and storing weather data.

Next was a multi-step "decision process" to proceed from identifying the weather/climate components of an issue to its completion by applying a solution. For example, a seeding project may be considered for an area and weather data will need to be gathered. Exactly what weather data are needed and where these data can be obtained will be determined. The decision process

was used in group exercises and actual examples through case studies ranging from air resource management, aerial spraying, ski area development, reforestation improvement, noxious weed control, smoke management, and ecological applications.

Delivery systems were then discussed. Some examples are the Weather Information Management System (WIMS), Western Climate Information System (Wesclim), Climate Data Access Facility (CDAF), Automated Storage Conversion and Distribution System (ASCADS), as well as others. Access and retrieval of weather data were discussed by lecture and demonstration with personal computers and students were then able to have hands-on application during the evening sessions.

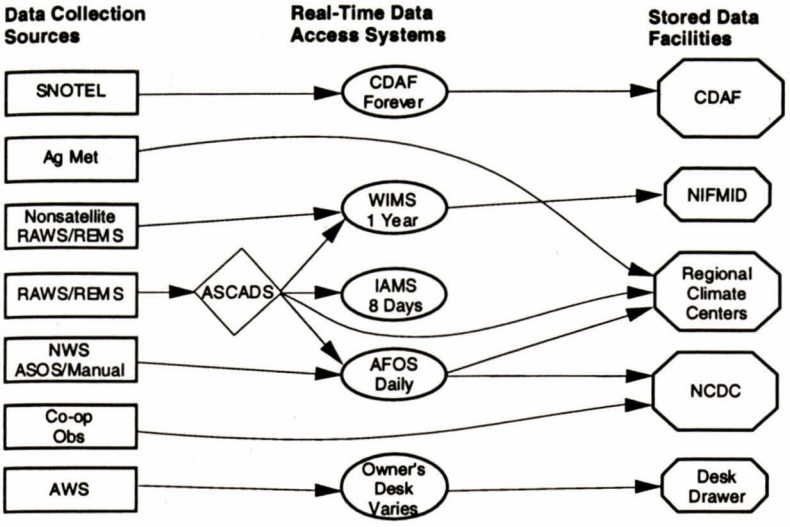
A big hit at the first evening session was a 1½-hour interactive lecture on basic meteorology by Bernie Meisner. There were displays of weather related RAWS/REMS and SNOTEL equipment. Videos such as Ozone, NEXRAD, and Thunderstorm were also shown each evening.

BLM set up two weather stations to show the course participants first-hand how the weather data are collected. On two occasions, we recorded 101°F temperatures. This may have been the first over 100°F temperatures recorded for the season in the Tucson area.

The participants listed their course expectations during the first day. These were listed under the following categories: weather and climate applications, meteorological and climatic processes, uses and applications of weather and climate information, weather and climate databases, weather/environmental monitoring equipment, interagency cooperation, quality control of data, model generated data, and statistical methods. More than 50 items were recorded. At the close of the course, each student was asked to mark whether or not each expectation was met. Some indicated that ALL were met, and the class as a whole indicated that over 90 percent were met. The course evaluation also reflected this, as most students gave it high marks and even suggested ways of improvement. Overall the vote was to present the course again next year. Currently the plans are to review all the course change suggestions and modify the course accordingly. The course is currently scheduled for the same time next year at NARTC.

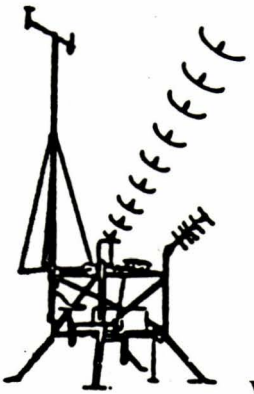
The steering committee and cadre are to be congratulated on a job well done.

## Primary Access Points to Observed Weather Data




**Source: WACRM 4/21/94**

A picture is worth a thousand words, so this diagram is used to save paper in this article. It shows the flow of data from collection to storage and who sends it.



# Forest Service Weather Program

## Working with the Weather

**Caring for the Land—Serving the People**

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